

What is Claimed:

- 1 1. A system for positioning an object by rotating the object about
2 a remote center of rotation, the system comprising:
- 3 a non-movable part providing a stationary reference structure;
- 4 a movable part movable relative to the non-movable part;
- 5 a connector coupled between the movable part and the object
6 for positioning the object adjacent the remote center of rotation and for rotating the
7 object about the remote center of rotation responsive to movement of the movable
8 part, a movement of the connector being responsive to a movement of the movable
9 part;
- 10 a first force transmitting means coupled to the movable part for
11 moving the movable part and the connector in a first direction, wherein movement of
12 the connector in the first direction rotates the object about a first axis passing
13 through the remote center of rotation; and
- 14 a second force transmitting means coupled to the movable part
15 for moving the movable part and the connector in a second direction, wherein
16 movement of the connector in the second direction rotates the object about a second
17 axis passing through the remote center of rotation.
- 1 2. The system of claim 1, wherein the movement of the movable
2 part in the first direction is orthogonal to the movement of the movable part in the
3 second direction.

1 3. The system of claim 1, wherein the first force transmitting
2 means includes at least a first flexure coupled to the movable part, the first flexure
3 exhibiting a first stiffness in the first direction and a second stiffness in the second
4 direction, the second stiffness being greater than the first stiffness.

1 4. The system of claim 3, wherein the second force transmitting
2 means includes at least a second flexure coupled to the non-movable part, the
3 second flexure exhibiting a first stiffness in the first direction and a second stiffness
4 in the second direction, the second stiffness being greater than the first stiffness.

1 5. The system of claim 1, wherein the movable part is positioned
2 in a plane that is movable in the first direction and the first force transmitting means
3 moves the plane in the first direction.

1 6. The system of claim 5, wherein the plane is movable in the
2 second direction and the second force transmitting means moves the plane in the
3 second direction.

1 7. The system of claim 1, wherein the connector has an adjustable
2 length.

1 8. The system of claim 1, wherein the movable part has an
2 opening for receiving the connector, the opening and the connector being movable
3 responsive to the movement of the movable part, and a slit dividing the movable
4 part into a plurality of portions with the opening being located within one of the
5 portions, the system further comprising a third force transmitting means for moving
6 the portion having the opening.

1 9. The system of claim 1, wherein the connector extends beyond a
2 volume formed by the plurality of flexures.

1 10. The system of claim 1, wherein the first and second force
2 transmitting means include a plurality of flexures, each of the flexures having a
3 longitudinal axis that passes through the remote center of rotation.

1 11. The system of claim 10, wherein the connector is disposed
2 between the plurality of flexures.

1 12. The system of claim 10, wherein the plurality of flexures are
2 made from a Cu-Be material.

1 13. The system of claim 10, wherein the plurality of flexures are
2 made from a spring-steel material.

1 14. The system of claim 10, wherein the plurality of flexures are
2 made from a material exhibiting a super-elastic effect.

1 15. The system of claim 10, wherein the plurality of flexures are
2 made from a shape memory alloy.

1 16. The system of claim 10, wherein the plurality of flexures are
2 made from a material selected from the group consisting of Ni-Ti; Ni-Ti-X where X is
3 Cu, Hf, Zr, Pd, Co, or Fe; Cu-Zn-Al; and Cu-Al-Be.

1 17. The system of claim 10, wherein the plurality of flexures are
2 made from a metallic material.

1 18. The system of claim 10, wherein the plurality of flexures are
2 made from a plastic material.

1 19. A system for positioning an object by rotating the object about
2 a remote center of rotation, the system comprising:

3 a first part providing a reference structure;

4 a second part movable relative to the first part;

5 a plurality of flexures coupled to the second part for moving the
6 second part relative to the remote center of rotation when at least one of the flexures
7 is deflected;

8 a connector coupled between the second part and the object for
9 rotating the object about the remote center of rotation responsive to a movement of
10 the second part; and

11 a force transmitting means coupled to the plurality of flexures
12 for deflecting the at least one flexure into at least one fixed configuration.

1 20. The system of claim 19, wherein the remote center of rotation
2 is located inside the object.

1 21. The system of claim 19, wherein the remote center of rotation
2 is located outside the object.

1 22. The system of claim 19, wherein the remote center of rotation
2 is located on the surface of the object.

1 23. The system of claim 19, wherein the connector holds the object
2 in a fixed position relative to the remote center of rotation.

1 24. A system for positioning an object at a remote center of
2 rotation, the system comprising:

3 a non-movable part providing a stationary reference structure;

4 a movable part movable relative to the non-movable part;

5 a connector coupled to the movable part and the object for
6 positioning a section of the object at the remote center of rotation responsive to a
7 movement of the movable part; and

8 a force transmission means coupled to the movable part for
9 moving the movable part and positioning the section of the object at the remote
10 center of rotation responsive to the movement of the movable part.

1 25. The system of claim 24, wherein the section of the object is in a
2 plane that rotates about the remote center of rotation responsive to the movement of
3 the movable part.